HEAT TREATMENT OF THE STAMP HOT DEFORMATION

K. V. Berladir – Sumy State University, group MT-71
M. N. Dunaeva – EL Adviser

The priority of metallurgy today is to develop new high-strain-hardening regimes that will improve the level of physical and mechanical properties and performance stamping tools.

For the manufacture of stamping blanks by hot deformation in forging machines are used special tools – stamps. In accordance with the applicable standart stamp is a tool for forming, surface and contour of one or both parts of which corresponds to the processed part or blank.

Design stamps depend on their purpose, deformation character, method of loading, mode of action and other factors. Various configurations of stamps are used for preliminary and final operations. Stamps can be divided into opened (for stamping with burr) and closed (for stamping without burr). They are used to perform various operations on the deformation character: cutting, precipitation, extrusion, bending and combined deformation. Stamps hot deformation consists of the following parts: lower half, upper half, punch, matrix and ejector.

Influence of cyclic temperature-force action on an engraving of stamp determines the main types of damage to the instrument, which exclude its use:

1. Wear parts engravings, leading to a change in the size of die cavity due to the removal from the surface layer of metal.
2. Plastic deformation (collapse) of elements of engraving, causing a change in its size and shape.
3. Cracks thermal (thermomechanical) origin.
4. Cracks mechanical fatigue.

The metal, used for hot stamping, must have certain properties, such as: high-temperature strength, red hardness, thermal resistance, toughness and hardenability. Alloy steels correspond to these requirements. The most common is the steel HNM5 and its substitutes: HGM5, HNSV5 and HNT5.

Steel HNM5 has a high impact strength and ductility, high hardenability. But along with this, steel characterized by a low thermal resistance, which does not provide the required operational stability stamp tool.

As the heat treatment of steel HNM5 for stamps hot deformation can be used thermocycling process – heat treatment under conditions of cyclic thermal effects, allowing obtaining the plasticity and toughness preserving the strength characteristics.

Thermocyclic treatment consists of two cycles of heating to 840 °C, cooling between the cycles is in the air to from 250 to 300 °C and with the last cycle - in the oil, duration at each heating is 60 minutes. It also includes tempering at 370 °C.

As a result of such a regime stamps after thermocycling treatment showes maximum resistance and hardness from 44 to 45HRC.